The main objective of the study was to determine the association of household food security status with mother/caregiver-child pair’s (MCCP) nutritional status using Household Food Insecurity Access Scale (HFIAS) and Food Consumption Score (FCS). MCCP’s nutritional status was categorized into two: household with chronic energy deficient (CED) mother/caregiver and/or at least one child who was stunted, and household without CED mother/caregiver and stunted child. Secondary data from the 2013 National Nutrition Survey conducted by DOST-FNRI was used for the study. Mothers/caregivers who were included in the study were non-pregnant aged 19 years and above, their children, and their household characteristics. Descriptive and analytical analysis via binomial logistic regression was done using Stata 12.1. Results showed that the HFIAS gave the highest estimated prevalence of food insecurity with 75.1% (95% CI: 73.9-76.3) while for FCS, it was 15.7% (95% CI: 14.7-16.8). The estimated proportion of households with CED mother/caregiver and/or at least one stunted child was 38.7% (95% CI: 37.5-39.9), while those households without CED mother/caregiver and stunted child was 61.3% (95% CI: 60.1-62.5). Significant associations were observed after adjusting for the confounding variables. For the HFIAS indicator, food insecure households were 1.28 (95% CI: 1.09-1.48) times more likely to have a mother/caregiver with CED and/or at least one stunted child than food secure households. Food insecure households classified by the FCS indicator had 22% (95% CI: 1.01-1.35) higher chance than food secure households to have a CED mother/caregiver and/or at least one stunted child. There was a significant association between household food insecurity and occurrence of undernutrition in a household. To improve the households’ nutritional status interventions that are both nutrition specific and nutrition sensitive should be implemented. More researches have to be done to identify the sensitivity and specificity of the household food security indicator in accurately identifying food insecure household.

Key words: FCS; food security; HFIAS; mother-child pair; National Nutrition Survey; stunting

INTRODUCTION

Food security is defined as a situation that exists when all people, at all times, have physical, social, and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (FAO 2006). Food security is not easily achieved by households and individuals because of poverty, inadequate food supply, climate change, and many other interacting factors (UNICEF 2009). It is one of the problems faced by the world today, including the...
Philippines. In 2013, only 34.1% of Filipino households were considered food secure based on the National Nutrition Survey conducted by Food and Nutrition Research Institute of the Department of Science and Technology (DOST-FNRI) (DOST-FNRI 2013b).

In 2016, the United Nations (UN) presented the 17 Sustainable Development Goals (SDGs) to be achieved by 2030 (UN 2016). Goal number two of the SDG is to end hunger, achieve food security and improved nutrition, and promote sustainable agriculture. One of nine people in the world is considered undernourished and the majority of them are from developing countries where half of the world’s hungry people live (UN 2016). Being hungry is the extreme consequence of food insecurity. Hunger is caused by insufficient food consumption. Thus, food insecurity threatens the nutritional status of an individual.

Studies done in Vietnam, Bangladesh, Ethiopia (Ali et al. 2013), Nepal (Singh et al. 2014) and Ghana (Saaka & Osman 2013) have shown that food insecurity has a consistent direct relationship with undernutrition, especially with stunting.

Children have high nutritional requirements and are known to be dependent on household’s food supply. Therefore, they are the most vulnerable to the effect of food insecurity. It is very important for children to attain optimal nutritional status because this can affect their economic opportunities later in life. The World Bank estimates that 1% loss in adult height leads to 1.4% loss in economic productivity (World Bank 2006).

But there are limited local studies regarding the impact of household food insecurity to nutritional status. The results of foreign studies may not be the case in the country because of the environment and socio-cultural differences. In addition, these studies measured household food security in association with the nutritional status of a child and mother at an individual level and not at a household level. Household level measurement of nutritional status such as having a mother and child with undernutrition status in a household can give a more reliable impact of food insecurity to the household. At an individual level of measurement, individual factors need to be considered such as age, sex, and health status of an individual.

The general objective of this paper was to determine if there is an association between household food insecurity with mother/caregiver-child pair’s nutritional status. The specific objectives were the following: (1) to estimate the proportion of food insecure household using: (a) HFIAS and (b) FCS; (2) to estimate the proportion of Filipino household with mother/caregiver and/or at least one child aged zero to five years old who is undernourished; and (3) to determine the association between household status of food security with mother/caregiver-child pair’s nutritional status using (a) HFIAS and (b) FCS as measures of food insecurity.

METHODOLOGY

Study Design and Sampling
The data for this study came from the 2013 National Nutrition Survey, of a cross-sectional analytic study design. Household food insecurity and nutritional status of mother/caregiver and children were assessed at one point in time. The 2013 National Nutrition Survey adopted the 2003 master sample of the Philippine Statistics Authority, which utilized the 2009 Labor Force Survey. The master sample was a stratified multi-stage sampling design covering all regions of the country (please refer to this site http://www.fnri.dost.gov.ph/images/facts_and_figures/Overview.pdf for the detailed description of the methodology employed by the survey.)

For this study, only Filipino households with children aged zero to five years were included. Four replicates were used to measure mother/caregiver-child pair’s nutritional status. A total of 13,423 pre-school children aged zero to five years old from the four replicates were included in the survey. The total number of sampled households with children aged zero to five years old that were included in the study was 10,614. For extended households, all children aged zero to five years old in that household were sampled via random numbers using Microsoft Excel. Sampled child (aged 0-5 years old) and their family (i.e., father, mothers and brother or sister aged 19 years old and above as caregivers) were used for the study.

Participants in the study included all mothers/caregivers who were aged 19 years old and above and their children. Adolescent mothers were excluded in the study because of their higher risk of having an undernutrition status and having a child with undernutrition status. Pregnant mothers were also excluded because their nutritional status was not measured in the survey, only their risk for delivering low birth weight infants. Furthermore, the study was limited to mother/caregiver-child pair with complete information on the variables needed for the study. The total number of eligible households was 9,072, but only 6,984 households have complete information and thus included for the study.

The study was approved by the Food and Nutrition Research Institute Institutional Ethics Review Committee and the UP Manila Review Ethics Board.

Data Collection
FNRI researchers for the 2013 National Nutrition Survey
were trained on the procedures of obtaining proper anthropometric measurements procedure and proper conduct of face-to-face interview (DOST-FNRI 2013a).

For the food security questionnaire, the Household Food Insecurity Access Scale (HFIAS) was translated to Filipino by the food security component study team in DOST-FNRI.

Table 1. Household food insecurity access scale questions.

<table>
<thead>
<tr>
<th>No.</th>
<th>Food Security Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>In the past four weeks, did you worry that your household would not have enough food?</td>
</tr>
<tr>
<td>2</td>
<td>In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?</td>
</tr>
<tr>
<td>3</td>
<td>In the past four weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources?</td>
</tr>
<tr>
<td>4</td>
<td>In the past four weeks, did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?</td>
</tr>
<tr>
<td>5</td>
<td>In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?</td>
</tr>
<tr>
<td>6</td>
<td>In the past four weeks, did you or any household member have to eat fewer meals in a day because there was not enough food?</td>
</tr>
<tr>
<td>7</td>
<td>In the past four weeks, was there ever no food to eat of any kind in your household because of lack of resources to get food?</td>
</tr>
<tr>
<td>8</td>
<td>In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food?</td>
</tr>
<tr>
<td>9</td>
<td>In the past four weeks, did you or any household member go a whole day and night without eating anything because there was not enough food?</td>
</tr>
</tbody>
</table>

The total score from the HFIAS can range from zero (food secure) to 27 (maximum food insecurity). The score is based on the frequency of occurrence of the food security questions being asked. A household is given a score of zero if the situation never occurred, one is given if the situation occurred rarely (one to two times per month), two is given if the situation occurred sometimes (three to 10 times a month), and three is given if the situation occurred often (more than 10 times a month). HFIAS classifies households as food secure, mildly food insecure, moderate food insecure, and severely food insecure (Coates et al. 2017). For this study, there were only two classification of households – food secure if classified by HFIAS as food secure or food insecure if classified by HFIAS as mildly food insecure, moderate food insecure, and severely food insecure.

For the Food Consumption Score (FCS), the individual in charge of food preparation was asked on the frequency of household consumption of nine food groups – the staples (rice, maize, potatoes, etc.), pulses, vegetable, fruits, meat and fish, dairy products, sugar, and oil – for the past seven days. The frequency of consumption of each food group is multiplied by an assigned weight for each food group (Jones et al. 2013). The weight is based on the nutrient density of the food groups. For this study, a household was classified as food secure if the score was greater than or equal to 49 points; otherwise, they were considered as food insecure.

All collected data including anthropometric measurements were entered in the Electronic Data Collection System (EDCS). The EDCS is a data entry system for the 2013 National Nutrition Survey. Validation checks were included in the system to check completeness, incorrect codes or entries encoded, double and inconsistent entries, and outliers (DOST-FNRI 2013c).

Public use files (microdata) containing all the variables needed for the study were obtained from the Nutrition Assessment and Monitoring Division (NAMD) via remote desktop connection of FNRI. One data set was created that included the mother/caregiver-child pair’s (MCCP’s) nutritional status, the two different indicators of food security, and household characteristics.

Data Processing and Analysis

For this study, data were processed using Stata version 12. To account for the complex survey design of the data, survey module of the Stata was used in the analysis.

To answer the specific objectives, frequencies, percentages, and binary logistic regression were employed. Frequencies and percentages were used to describe the study sample and consequently categorized household into food secure and food insecure based on the three indicators used in the study.

Confounders in the study were checked for their probability as confounders by using crude simple logistic regression between the outcome variable (MCCP’s nutritional status) and the explanatory variables, with a p-value cut off of less than 0.25. Variables with a p-value of less than 0.25 were included in the full model. The backward elimination process was used to identify significant confounders. The order of elimination started with the variable with the largest p-value. Those variables with a change in estimate of >10% – as computed by the difference of the odds ratio (OR) between the reduced and the full model divided by the OR of the full model and multiplied by 100 – were considered as significant confounders and was included in the final model.

Meanwhile, the significance of household wealth quintile as a probable effect measure modifier was checked via the use of full model with interaction term. If p-value of the interaction term was greater than 0.05, it was not considered as an effect measure modifier.
RESULTS

General Description of the Sample Households
The socio-demographic characteristics of the households are presented in Table 2. In the sample used for the study, 57.6% were from rural areas and most had a sample size of more than five household member. Majority of the father’s age (47.1%) and the mother/caregiver’s age (48.1%) were aged 30 to 40 years old. For the father (71.3%) and mother’s educational attainment (70.4%), most of them were elementary or high school graduate.

For the socio-economic characteristics, 28% were considered under the poorest wealth quintile. Majority of the job of the household’s head was non-agriculture at 51.4%, while majority of the mothers were non-working at 73.2%.

Table 3 presents the frequencies of the occurrence of undernutrition in a household. Most of the household did not have chronic energy deficient (CED) mother/caregiver and stunted child at 60.1%, while there were least households with CED mother/caregiver and at least one stunted child at 4.3%.

Table 3. Frequencies of the occurrence of undernutrition in sample households, Philippines, 2013 (n=6,984).

<table>
<thead>
<tr>
<th>Nutritional status of mother/caregiver and child</th>
<th>Freq.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>With CED mother/caregiver and/or at least one stunted child</td>
<td>2,790</td>
<td>39.9</td>
</tr>
<tr>
<td>With CED mother/caregiver and at least one stunted child</td>
<td>303</td>
<td>4.3</td>
</tr>
<tr>
<td>With CED mother/caregiver only</td>
<td>336</td>
<td>4.8</td>
</tr>
<tr>
<td>With at least one stunted child only</td>
<td>2,151</td>
<td>30.8</td>
</tr>
<tr>
<td>Without CED mother/caregiver and stunted child</td>
<td>4,194</td>
<td>60.1</td>
</tr>
<tr>
<td>Total</td>
<td>6,984</td>
<td>100</td>
</tr>
</tbody>
</table>

Prevalence of Food Insecurity
There was a big difference in the point estimate of household food insecurity using the two food security indicators. HFIAS generated a 75.1% food insecurity prevalence compared to only 15.7% as measured by the FCS indicator.

Table 4. Estimates of prevalence of food insecurity using the two indicators of food security.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Point estimate of prevalence</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>HFIAS</td>
<td>75.1</td>
<td>73.9-76.3</td>
</tr>
<tr>
<td>FCS</td>
<td>15.7</td>
<td>14.7-16.8</td>
</tr>
</tbody>
</table>

Cross-classification of Food Security Status
Table 5 presents the cross classification of the households using the two different indicators of food security. Based on the table, it can be concluded that about 6.3% of food secure household classified by HFIAS were classified by FCS as food insecure, while 78.9% that was classified
by FCS as food secure were classified by HFIAS as food insecure. In total, there were 85.2% of households who did not have the same classification using the two indicators.

### Association of Food Security Status with MCCP’s Nutritional Status

Binary logistic regression was used to determine the association between household food security status and MCCP’s nutritional status. Table 6 shows the unadjusted and adjusted odds ratio for the association between food security status and MCCP’s nutritional status. Based on the full model, wealth index was not a significant effect measure modifier (EMM) for the association. Thus, a single OR was generated. Controlling for the confounding effects of household wealth index, food insecure households as measured by HFIAS had 28% higher chance of having a CED mother/caregiver and/or at least one stunted child (OR: 1.28, 95% CI: 1.09-1.48).

Meanwhile, wealth index was also identified as a confounding factor in identifying the association between food security status – as measured by FCS – and MCCP’s nutritional status. Using FCS, the likelihood of a household to have a CED mother/caregiver and/or at least one stunted child (OR: 1.22) was higher for food insecure household than food secure household.

### DISCUSSION

#### Prevalence of Food Insecurity

The FAO measured the percent of undernourishment in the country at 13.5% in 2015. FAO defined undernourishment as the percentage of person who is not able to acquire enough food to meet the daily minimum dietary energy requirements, over a period of one year (FAO-IFAD-WFP 2015). FAO used this definition as a measure of food security. Meanwhile, the Global Hunger Index (GHI) – an indicator developed by the International Food Policy Research Institute (IFPRI) to measure and track hunger globally – reported that GHI of the Philippines in 2016 is 19.9, which is indicative of moderate hunger level. GHI is computed from the proportion of the population that is undernourished, stunted, and wasted children aged zero to 60 months and child mortality (IFPRI 2016). The 2013 National Nutrition Survey conducted by DOST-FNRI, which measures food insecurity through HFIAS, showed a prevalence of 48.7% (DOST-FNRI 2013b).

It should be noted that these prevalences of food insecurity were national level estimates across all households, while this study estimated the prevalence of food insecurity among Filipino households with children aged zero to 60 months old. The estimated food insecurity prevalence of 75.1% by HFIAS was higher than the national estimate of 48.7%. It showed that household food insecurity is a prevalent problem in households with children aged zero to 60 months old.

Between the two indicators used in the study, HFIAS gave the highest prevalence of food insecurity. It was estimated that 75.1% of household experienced some form of food insecurity based on HFIAS. According to a study of seven different household food security indicators by Maxwell and co-authors (2013), HFIAS gave the highest prevalence of food insecurity because the question included less severe manifestation of food insecurity such as psychological anxiety and food consumption preference. In addition, it also ranks households from mild to severe form of food insecurity. Barett (2010) also noted that a perception-based indicator such as the HFIAS is higher than insufficient intake measure because food insecurity can be seasonal or regular but periodic. For example, food insecurity is associated with temporary unemployment, episodes of ill health, adverse weather condition, or man-made disaster. These events are regularly occurring from time to time and people anticipate these events and they regularly engage in behaviors that can lower their risk for food insecurity (Barett 2010).

Certain limitations with the method of the HFIAS indicator may be a contributing factor for the very high estimate of food insecurity. Mothers or the household informant may
not give an honest answer to their hunger situation or they simply could not recall the household’s past experience in the last 30 days. In addition, the mother or household informant interviewed could have given answers or experiences that were unique to him/her and may not be a general representation of the household’s situation. The HFIAS indicator was also not culturally validated for use in the Philippines. Thus, it may not accurately capture the true food insecurity situation of the household.

The estimated prevalence of food insecurity using the FCS in this study was only about 16%. However, this result was expected as explained by different studies. Validation studies (Lovon & Mathiassen 2014; Weismann et al. 2009) done showed that FCS can underestimate the true caloric intake of households. Fewer households were being classified as food insecure with the use of this indicator (Lovon & Mathiassen 2014).

In the study done by Maxwell and co-authors (2013) of different food security indicators, FCS gave the second to the lowest prevalence after the Household Hunger Scale, which measures the extreme consequence of food insecurity. In a study done in Ghana (Saaka & Osman 2013) among children aged six to 36 months old that used both HFIAS and FCS, FCS also gave the lowest prevalence of food insecurity at 20.5% compared to 54% of HFIAS.

FCS can be considered as a dietary recall method and can be prone to recall bias and may yield an inaccurate measure of food intake of the household. It may also not capture the usual intake of the household due to seasonality as well as the day-to-day variability of the household intake. Their supply of food may be abundant during harvest season and thus this may reflect higher FCS scores if the household was interviewed during this time.

**Occurrence of Undernutrition in a Household**

Most of the studies (Saaka & Osman 2013; Betebo et al. 2017; Singh et al. 2014; Ali et al. 2013) done that examined the relationship between household food security and nutritional status among mother or children measured the outcome variable via individual level. This study measured the outcome variable via household level, such as the likelihood of a household to have a CED mother/caregiver and/or at least one stunted child.

Table 3 showed that an estimate of about 39.9% households have mother/caregiver and/or child that have some form of undernutrition while an estimate of about 60.1% households did not have a mother/caregiver and child that have an undernutrition status. There were no previous studies that measured the undernutrition status of two household members (i.e., mother and child) as one and associating it with household food security status.

It can be observed that there were least households with both CED mothers/caregivers and with CED mother/caregiver only. Majority were households with at least one stunted child only. Thus, it can be said that the children are the most vulnerable to a consequence of food insecurity, which is undernutrition.

Children have high nutritional requirements to support their growth and development. Because of this, pre-school children are the ones who had the highest probability of being energy deficient among household members.

According to the 2013 National Nutrition Survey, the prevalence of stunting is 30.3% among children zero to 60 months old (DOST-FNRI 2013). It can be said that the 30.3% stunting prevalence was concentrated on the 38.71% of the households with zero to 60 months. A large percentage of households with zero to 60 months child still do not have some form of stunting and CED for mothers/caregivers. Meanwhile, the prevalence of stunting based on the 2015 Updating Survey was 33.4% (DOST-FNRI 2016). This shows that there is no improvement in the chronic nutritional status of Filipino children aged zero to 60 months old.

**Association of Food Security Status Using HFIAS Indicator and MCCP’s Nutritional Status**

The result of this study was consistent with the previous studies (Betebo et al. 2017; Singh et al. 2014; Ali et al. 2013) done in different settings, generated ORs that is within the 95% confidence interval (1.09-1.48) of this study, while small sample size studies yielded higher ORs. This study showed that regardless of the outcome variable, it will still result in similar risks even if the variable is combined with the mother/caregiver’s nutritional status.

In South Ethiopia, food insecure household were seven times (95% CI: 3.71-12.10) more likely to have a stunted child than food secure household (Betebo et al. 2017) while in Nepal, the risk reported is 1.40 (95% CI: 1.05-1.85) (Singh et al. 2014). In the study that used large survey sample from Vietnam, food insecure households had 39% higher chance of having a stunted child (OR: 1.39; 95% CI: 1.16-1.65), while data from Ethiopia showed an OR of 1.48 (95% CI: 1.09-2.00) and Bangladesh yielded an OR of 1.36 (95% CI: 1.05-1.76) (Ali et al. 2013).

The studies mentioned used the categories of HFIAS in measuring the association; a few studies considered the point system of HFIAS such as the higher score the more food insecure a household is. In another study in Nepal by Sreeramareddy and co-authors using multiple linear regression analysis that accounts for the confounding, food insecurity was associated with height-for-age Z score (HAZ) $\beta=-0.02, p=0.01$. Specifically, a 10-point increase in household food access insecurity score was
associated with a decrease in HAZ of 0.2 (Sreeramareddy et al. 2014). However, one study in Ghana (Saaka and Osman 2013) among children aged six to 36 months that also used HFIAS showed no association with stunting. In this study, the score for HFIAS was divided into two. The cut-off point was 17 points; if the score was greater than 17 points, the household was considered food insecure. One possible reason for the insignificance association was that the HFIAS indicator should use four categories of food security status, not just two.

Other studies that used a different kind of subjective indicator or perception-based indicator also showed association with child’s nutritional status. For example, a study done in Sri Lanka – which identified food secure household through the use of United States Department of Agriculture’s food security survey module – found that children in food insecure household were 1.50 times (95% CI: 1.03-2.32) more likely to be stunted than children in food secure household (Thamilini et al. 2015). Another study done in an Asian country (particularly in Northeast Malaysia) looked into the association of food insecurity – measured through Radimer-Cornell – with the nutritional status of children aged two to 12 years old, with results showing that children in food insecure household were 3.04 times (95% CI: 1.42-6.49) more likely to be stunted than food secure household (Naser et al. 2014).

There were fewer studies done that looked into the relationship of household’s food insecurity status with mother’s nutritional status. In the study done in Nepal that used the data from the 2011 Nepal Health and Demographic Survey, it was found out that the household food insecurity – as measured by HFIAS – was associated with low BMI (<18.5) (OR: 1.50 95% CI: 1.17-1.92) (Singh et al. 2014). In another study done in Cambodia that also used HFIAS, it was found out that the risk of maternal thinness was two times higher (95% CI: 1.06-4.30) for severely food insecure household than food secure household.

**Association of Food Security Status Using FCS Indicator and MCCPs Nutritional Status**

Diet diversity has long been associated with household food security status. The diet diversity indicator used in this study was the FCS. The reported OR for the association of household food security status and MCCP’s nutritional status was 1.22 (95% CI: 1.01-1.35). There were fewer studies that looked into the association of FCS and nutritional status of mother/caregiver and children.

The same study done in Ghana by Saaka (2016) found that FCS was a significant predictor of stunting. When compared to children in food insecure households, children in food secure households are 46% protected from stunting (OR: 0.54 95% CI: 0.31-0.94).

Other studies used household diet diversity score to measure the association. For example, in a study done in Mali (Hatloy et al. 2000) among children six to 59 months old, children from the urban household with low diet diversity score had a double risk of being stunted (OR: 2.30 95% CI: 1.30-4.00). Another study in Bangladesh (Rah et al. 2010) also found that high DDS was associated with a 15%, 26%, and 31% reduced odds of being stunted among children aged six to 11 months, 12 to 23 months, and 24 to 59 months (OR:0.85 95% CI: 0.76-0.94; OR: 0.74 95% CI: 0.69-0.79; OR: 0.69 95% CI:0.66-0.73).

However, this study used individual diet diversity intake of the child rather than household diet diversity.

Among mothers, the correlation between FCS and HDDS and nutrition status of pregnant and lactating mothers was also done in the study conducted by DOST-FNRI using the data from the 2013 National Nutrition Survey. The result showed that both FCS (p=0.046) and HDDS (p<0.001) were significantly correlated with the nutritional status of lactating but not with pregnant women.

Even though FCS yielded a low prevalence of food insecurity, it showed significant association with the MCCP’s nutritional status. Interestingly, the percentage of risk between FCS food security status and MCCP’s nutritional status and the risk between HFIAS food security status and MCCP’s nutritional status were close, with just a difference of 5%. It can be said that HFIAS and FCS, which determine different dimensions of food security, relatively measured the same construct of food security when it is associated with nutritional status of mother/caregiver and/or children.

Studies comparing FCS with household energy intake have noted that FCS did not appropriately identify food insecure household (Lovon & Mathiassen 2014; Weismann et al. 2009). It is possible that measurement of food intake done by these studies may not be enough to capture household’s usual intake. However, in terms of measuring another outcome of food insecurity – undernutrition – the FCS can be reliable because it showed a significant association.

Limitations with the FCS should also be considered. The FCS is a dietary recall method, thus day-to-day variability and seasonality of the intake have to be considered. One FCS score may not be enough to capture the usual intake of the household. Higher risk of undernutrition may have been obtained if there were two or more rounds of FCS assessment.

**CONCLUSION**

Food security has four dimensions, namely food availability, food access, food utilization, and the stability
of the first three dimensions through time. The dimensions are hierarchical in nature such that availability is necessary but not sufficient to ensure access, which in turn necessary but not sufficient for effective utilization (Barett 2010). Similarly, it is not also sufficient to ensure stability.

With these different dimensions, household food security indicators inherently measure the different dimension of food security. The HFIAS measures physical and economic access to food through household’s perceived experiences, and the FCS measures household actual access to food because it should be based on the recall of food items actually consumed by the household.

This study showed that the use of the two different indicators can significantly predict the risk of having a CED mother/caregiver and/or stunted child. These indicators can capture the impact of food insecurity at the household level, specifically in terms of nutritional status. The measure of undernutrition is used as an outcome measure of one dimension of food security, which is food utilization (FAO-IFAD-WFP 2015). The significant association between food insecurity and nutritional status showed that the food security indicators used in this study can predict the risk of one of the outcomes of food insecurity.

In conclusion, this study provided evidence that food insecure households in the country have 22-28% higher risk of having an occurrence of undernutrition in a household. Thus, interventions for nutritional status improvement need not to be nutrition-specific only but also nutrition-sensitive. The indicators used in this study can be used for targeting households that may be at risk of having mothers/caregivers and children that have undernutrition status. However, more researches have to be done to identify the sensitivity and specificity of the household food security indicator in accurately identifying food insecure household.

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